5
.45
bd.
copy 2

AN ECOLOGICAL SURVEY OF THE PROPOSED PREACHER MEADOWS RESEARCH NATURAL AREA, TRINITY COUNTY, CALIFORNIA [1]

PSW FOREST AND RANGE EXPERIMENT STATION
STATION LIBRARY COPY

by

John Sawyer, John Palmer and Edward Cope, Department of Biology,
Humboldt State University, Arcata, CA 95521

August 1978

[1] Report to Region 5/PSW Research Natural Area Committee, U.S. Forest Service

AN ECOLOGICAL SURVEY OF THE PROPOSED PREACHER MEADOWS RESEARCH NATURAL AREA, TRINITY COUNTY, CALIFORNIA

by

John Sawyer, John Palmer and Edward Cope, Department of Biology, Humboldt State University, Arcata, CA 95521

The proposed 600-acre Preacher Meadows Research Natural Area in the Shasta-Trinity National Forest consists of Sections 17 and 20, T36N, R8W, MDM, Trinity Dam quadrangle (Figure 1). Section 17 is included in the Salmon-Trinity Alps Primitive area. The proposed Trinity Alps Wilderness border cuts diagonally through Section 17 from the northeast corner to include the northwest corner of Section 20.

Topographically, the area contains moderate to steep (30-95%) southeast, east, northwest and southwest-facing slopes. Most of the area, though, consists of east to southeast-facing slopes. The northwest third of Section 17 contains steeper southwest-facing slopes. Swift Creek runs from northwest to southeast through Section 17 and the northeast corner of Section 20. In one location the creek has carved the bedrock into a rather striking narrow gorge up to 90' deep. Flats or benches exist along and above both banks of Swift Creek, with those on the west being much wider. In the northwest corner of Section 17, above where Granite Creek joins Swift Creek, another level area is found. Elevations of the proposed RNA range from 3800' along Swift Creek to 5800' in the southwest corner of Section 20.

The area is underlain by ultrabasic intrusive rock. Moraines and other glacial deposits are found along the creek canyons and at higher elevations. Granitic erratics, along with peridotite rocks, are scattered throughout the region. Soils are shallow and some degree of instability is indicated by a slide found near the western boundary of Section 17. Talus slopes of large boulders are common, especially on the slopes west of Swift Creek.

The climate is typical for the eastern Klamath Mountains at similar elevations. Occasional summer thunderstorms may make annual precipitation here somewhat higher than for nearby Trinity Dam Station at 2500'. This station averaged 38.4" of annual precipitation over a ten year (1965-1974) period. Annual highs averaged 100.8°F and lows averaged 15.5°F for the same period. At the increased elevations of the proposed RNA overall lower temperatures are expected. The maritime influence predominating in the western Klamath Region is diminished here with a more continental climate prevailing.

The vegetation of the area is strikingly uniform in spite of aspect variability. A mixed forest variously dominated by Pseudotsuga menziesii, Pinus lambertiana, Calocedrus decurrens, Abies concolor and Pinus ponderosa is found throughout the proposed area. All species are well represented in the sapling and seedling layers as well as in the canopy. The shrub layer is well developed

and strongly dominated by Quercus vaccinifolia. The herbaceous layer is prominant only in meadows above Swift Creek.

Methods

The vascular plants of the area were inventoried in June and July 1978. Specimens of unknown taxa were collected and identified. Vouchers are filed in the Humboldt State University Herbarium (HSC). An ecological survey was conducted in late June and early July 1978. General reconnaissance suggested a single mixed forest type with Pseudotsuga menziesii and Pinus lambertiana as leading dominants. To sample canopy, understory and ground layers, 31 relevés were taken. Standard techniques (Mueller-Dombois and Ellenberg 1974) were used to determine species coverage and abundance. Association tables were produced to search for compositional differences which might constitute phases or distinct types.

Density and basal area were determined by the belt-transect method (Mueller-Dombois and Ellenberg 1974) in representative locations. At every other 100' interval, as measured by tape, trees > 4" diameter at breast height were taped. Some 30 of these 0.1 acre plots were taken. To determine productivity 10 healthy Pseudotsuga menziesii trees of varying sizes were aged by increment boring and their heights were measured.

Results

In the proposed RNA some 164 taxa were identified (Appendix I). These plants are typical of middle elevation Klamath Mountain flora (Sawyer and Thornburgh 1977). Two species, Darlingtonia californica and Cypripedium californicum, are considered sensitive.

The 31 relevés were grouped into association tables to search for compositional differences. This analysis yielded a single more or less uniform forest type (Table 1) here named Pseudotsuga menziesii/ Quercus vaccinifolia, after canopy and understory dominants.

Forest canopy cover is typically around 30 to 40% (Figure 2). Pseudotsuga is lacking as a dominant canopy tree at a few of the higher elevation sites which comprise a small portion of the area. At higher elevations Pinus lambertiana and Abies concolor form most of the canopy. This small area is the only location for Pinus monticola and Abies magnifica var. shastensis. At lower elevations and on more moist sites Pinus lambertiana becomes sparse and Calocedrus decurrens shares dominance with Pseudotsuga. Pinus ponderosa is also abundant at these elevations, particularly on the southwest-facing slopes on the northeast side of Swift Creek. It is also a major component of the canopy on the high flat area in the northwest corner of Section 17.

Abies concolor is more evident in the understory than are the other canopy species (Table 1). It appears possible that A. concolor

could make up a larger part of the canopy if it were not for repeated fires. Fire scars are seen on many large tree trunks.

The shrub understory is extensive, typically 80 to 100% cover, although rarely it can be as low as 30%. Often these areas of low shrub cover are boulder talus supporting only meager vegetation. Typically Quercus vaccinifolia makes up 95 to 100% of the shrub cover. Along stream courses and the banks of Swift Creek and Granite Creek Rhododendron occidentale constitutes 80 to 100% of the shrub cover with Ribes roezlii, Rhamnus purshiana and Spiraea densiflora also present. On the driest sites Ceanothus prostratus is often found along with Q. vaccinifolia. An unusually large number of Ceanothus taxa (Appendix I) are found in the area.

Polygala cornuta is the most ubiquitous of the few species sampled in the poorly developed herb layer. Cover values for this layer are normally around 5%. Herbs are all but lacking on south-facing slopes.

There are a few meadows on the bench above the west bank of Swift Creek at the southern limits of the proposed area. These are named Preacher Meadows on maps (Figure 1). Some smaller meadows and seepage areas are found along the trail on the east side of Swift Creek. These are not extensive, but have a very different composition from the forest. There are three distinct meadow phases which can be readily recognized. The differences are

apparently due to varying moisture conditions. Dry meadows are vernally wet, but dry later in the season. They were quite dry by 1 July 1978. They are characterized by Danthonia unispicata, Sisyrinchium bellum, Lotus purshianus, Dichelostemma multiflorum and Calochortus nudus. Moist meadows occur on sites wet through much of the season, but drying late. These meadows are characterized by Schoenolirion album, Deschampsia caespitosa, Helenium bigelovii and Danthonia californica. They grade into the perennially wet meadows along the margins of small creeks and in seeps. Such sites are dominated by Darlingtonia californica accompanied by Mimulus guttatus, Juncus spp., Carex spp., Narthecium californicum and occasionally by Cypripedium californicum. The latter species occurs abundantly in Section 21.

Tree density and basal area were calculated for the Pseudotsuga menziesii/Quercus vaccinifolia forest type. Trees averaged 127 acre $^{-1}$; basal area averaged 217.8 sq. ft. acre $^{-1}$. The considerably larger trees located on the bench in the northeast corner of Section 17 (Figure 5) resulted in an average density of 117 trees acre $^{-1}$ with an average basal area of 435 sq. ft acre $^{-1}$ for the plots taken there. Though the average basal area of the forest on this bench is twice that of the majority of the proposed area, it was not considered a separate entity because of limited extent and little compositional differences in canopy and understory.

A site index curve prepared (Figure 2) from height and age data gathered for 10 Pseudotsuga trees suggests modest site quality for the area (Table 2).

Summary

The proposed Preacher Meadows Research Natural Area consists of a rather uniform forest described as the Pseudotsuga menziesii/ Quercus vaccinifolia type. Vegetation pattern varies along streams and in meadows above Swift Creek. Probably the most productive site is the level bench in the northeast corner of Section 17, where trees are fewer and larger.

Evaluation

The forest of the proposed Preacher Meadows Research Natural Area is typical in both composition and quality of those on ultra-basics at mid-elevations in the eastern Klamath Region. Site quality is not high for these open, uneven-aged stands. More productive areas are noted in the northern part of Section 17 on a bench which continues into Section 8, and these areas should definitely be included.

Floristically the area has a rather standard "serpentine" component. The rather striking abundance of Darlingtonia californica and Cypripedium californicum are worth note. Preacher Meadows may yield more interesting taxa upon careful study. These meadows will make a definite contribution to the RNA and should be included. The large number of Ceanothus taxa, including obvious hybrids, is of special botanical interest.

Road access to the area is good. The Granite Creek and Swift Creek trails make for easier travel within the area as well. These trails may cause concern for "incompatible" recreational use. This is more apparent than real since recreation is mainly limited to trail use, and camping by the bridge across Swift Creek. Most, if not all recreation users have their goals set for Granite Lake or other areas well outside the proposed RNA. Since most of the lands are on the other (south) side of a rather formidable Swift Creek, or up steep slopes to the north, there should be little concern.

The existing Primitive Area boundary and eventual Wilderness boundary should be of little concern, and can easily accomodate RNA boundaries. The glacial speed at which wilderness definition is occurring for the Trinity Alps suggests that the RNA establishment will precede final Wilderness boundaries.

Establishment of Preacher Meadows RNA is strongly recommended (Figure 3). It should include not only Sections 17 and 20, but also parts of 8, 21, 28, 29 to include Preacher Meadows and the more productive bench which also occurs in Section 17. The RNA will represent a widespread, eastern Klamath Region forest type. Recreation use should not detract from research use on all but a small portion of the area. Roads and trails make for relatively easy access to these little disturbed forests on ultrabasic parent materials.

Literature Cited

Mueller-Dombois, D. and H. Ellenberg. 1974. Aims and methods of vegetation ecology. Wiley, New York. 547 p.

Sawyer, J. O. and D. A. Thornburgh. 1977. Montane and subalpine vegetation of the Klamath Mountains. In: M. G. Barbour and J. Major (eds.). Terrestrial vegetation of California. Wiley, New York. 1000 p.

Figure 1. Location of proposed Preacher Meadows Research Natural Area. Trinity Dam quadrangle, Trinity County, California.

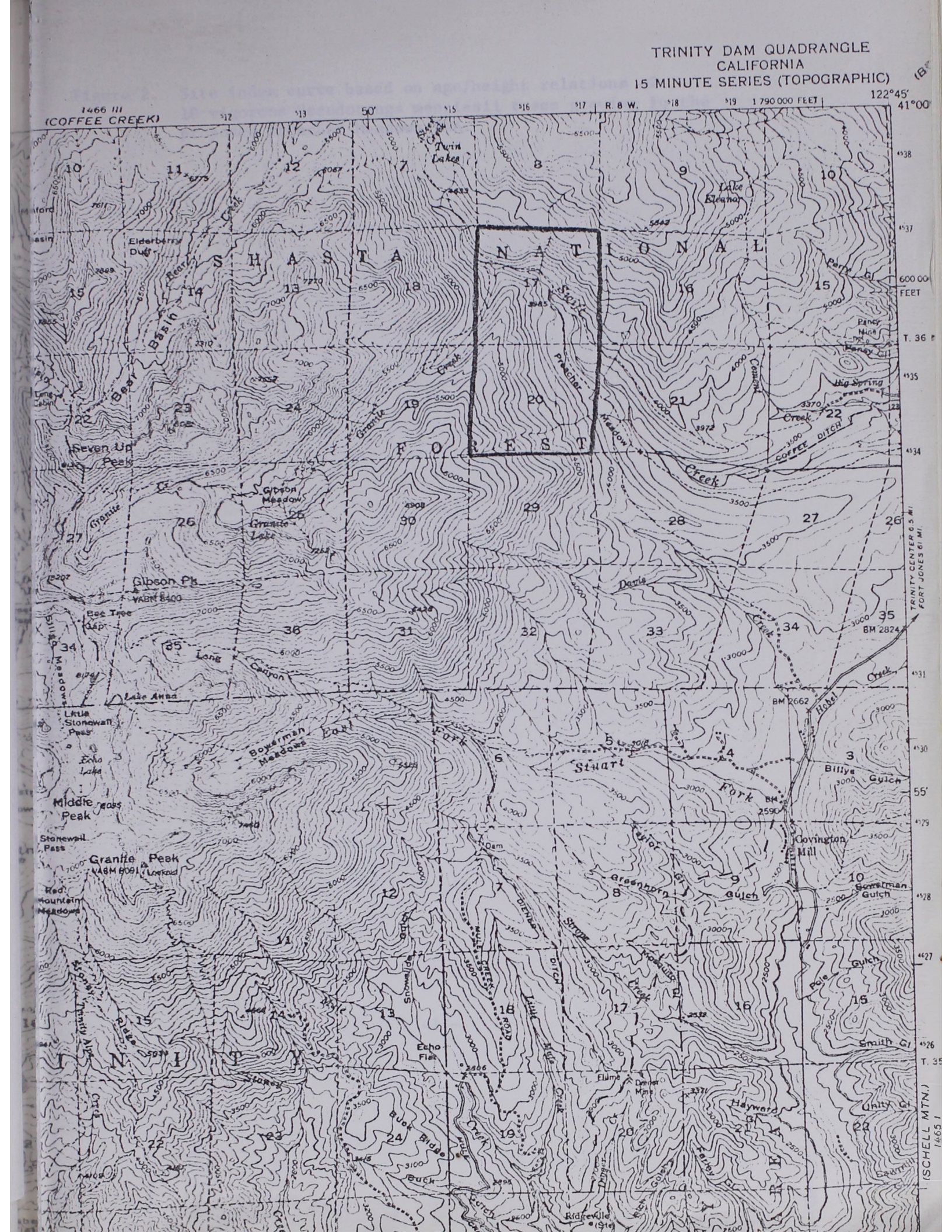
TRINITY DAM QUADRANGLE
CALIFORNIA
15 MINUTE SERIES (TOPOGRAPHIC)
122°45'
41°00'
1466 III
(COFFEE CREEK)
R. 8 W.
1 790 000 FEET
600 000 FEET
SHASTA NATIONAL FOREST
TRINITY ALPS WILDERNESS
Twin Lakes
Lake Eleanor
Elderberry Dug
Rear Creek
Bear Basin Creek
Seven Up Peak
Granite Creek
Gibson Meadow
Granite Lake
Gibson Pk
Bee Tree Gap
Billys Meadow
Long Canyon
Lake Anna
Little Stonewall Pass
Echo Lake
Middle Peak
Stonewall Pass
Granite Peak
Red Mountain Meadows
Boyerman Meadows
East Fork
Stuart Fork
Scott
Preacher
Cement
Big Spring
Coffee Ditch
Davis
Hobo
Billys Gulch
Covington Mill
Boerman Gulch
Pole Gulch
Smith Gl
Unity Gl
Haywood Gl
Fairley Gl
Taylor Gl
Greenhorn Gulch
Dam
Diversion Ditch
Surprise Creek
Meadows Creek
Snowslide
Echo Flat
Buck Ridge
Buck Creek
Flume
Dredger Mine
Ridgeville (site)
Trinity Alps
Granite
Stonewall
Ditch
Road
Trail
Lake
Creek
Fork
Gulch
Gl
Mine
Cabin
Spring
Dam
Flume
Ridge
Basin
Meadows
Pass
Peak
Flat
Lookout
VABM 8400
VABM 8091
BM 2824
BM 2662
BM 2590
TRINITY CENTER 6.5 MI.
FORT JONES 61 MI.
T. 36 N.
T. 35 N.
(SCHELL MTN.)
1465 I

Figure 2. Site index curve based on age/height relations of 10 vigorous Pseudotsuga menziesii trees growing in the proposed Preacher Meadows RNA.

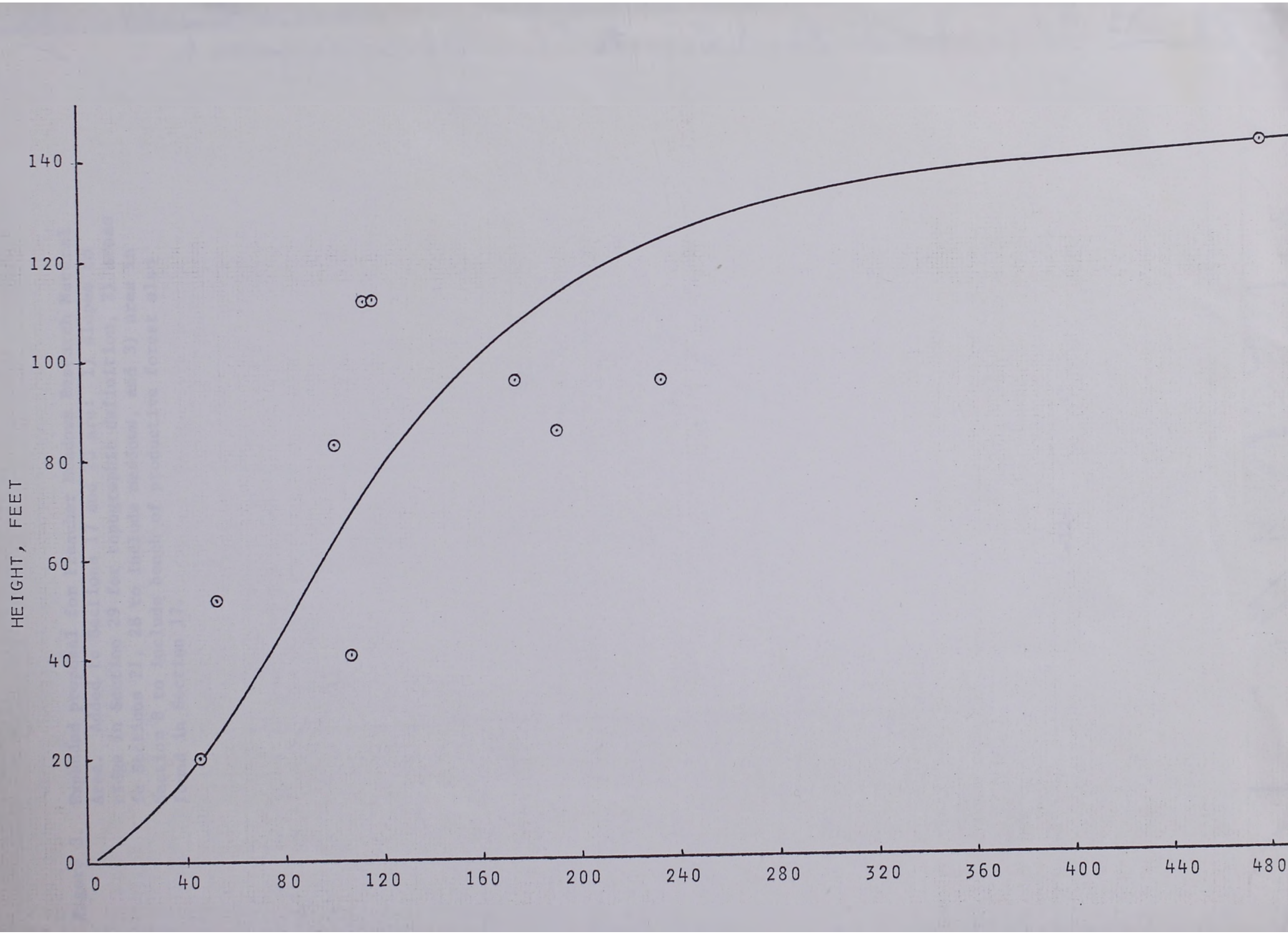
HEIGHT, FEET
0
20
40
60
80
100
120
140
0
40
80
120
160
200
240
280
320
360
400
440
480

Figure 3. Expanded proposal for Preacher Meadows Research Natural Area. Added to Sections 17 and 20 are: 1) slopes to ridge in Section 29 for topographic definition, 2) areas in Sections 21, 28 to include meadows, and 3) area in Section 8 to include bench of productive forest also found in Section 17.

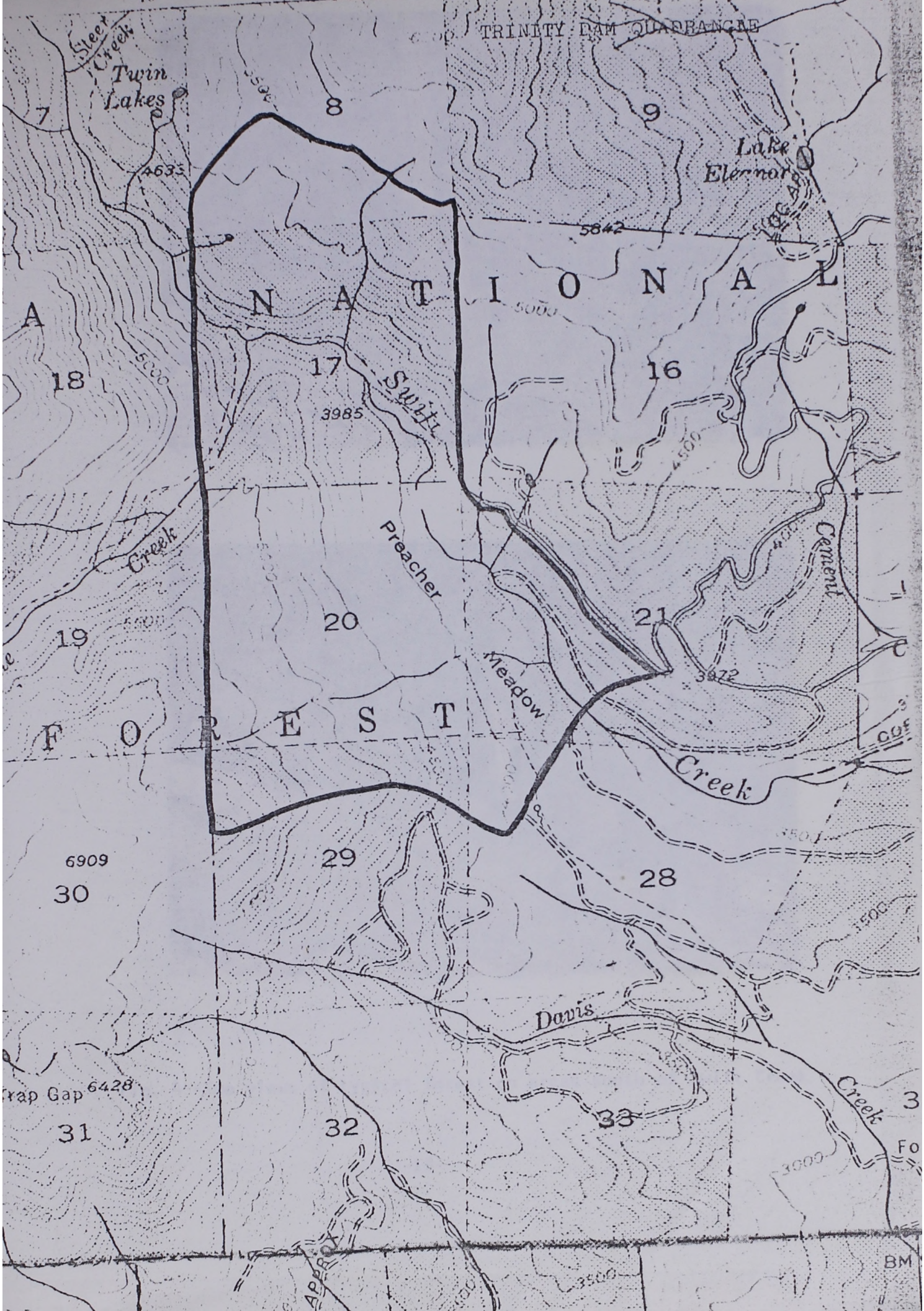
TRINITY DAM QUADRANGLE
Sleet Creek
Twin Lakes
Lake Eleanor
5842
NATIONAL
FOREST
Swift
Preacher
Creek
Meadow
Cement
Creek
Davis
Creek
Trap Gap 6428
6909
4633
3985
3972
7
8
9
16
17
18
19
20
21
28
29
30
31
32
33
5000
4500
4000
3500
3000
BM

Fig. 4--Two views of typical forest on areas south of Swift Creek.

Fig. 5--More productive stand on bench in northern part of Section 17 and Section 8.

Fig. 6--Swift Creek in western part of Section 17. Granite Creek adds substantially to water volume in Swift Creek below their junction.

a

--Preacher Meadows:
a) dry Danthonia meadows.
b) mesic Schoenolirion-Helenium meadows.
c) wet Darlingtonia meadows in Sections 20,21,28.

b

c

Table 1. Presence (P%) and modal cover/abundance for all sampled trees and shrubs, and for herbs with greater than 10% presence. Data from 31 relevés. Cover/abundance scale: 1 = one individual, 2 = sparse and less than 10%, 3 = common and more than 10%, 4 = 10-25%, 5 = 25-50%, 6 = 50-75%, 7 = more than 75%. Applicable subspecific nomenclature in Appendix I.

TREES, CANOPY	P%	C/A
Pseudotsuga menziesii	94	3
Pinus lambertiana	87	3
Calocedrus decurrens	84	3
Abies concolor	52	2
Pinus ponderosa	42	4
Pinus jeffreyi	39	2
Pinus monticola	6	2
Abies magnifica	3	1
TREES, SAPLING		
Calocedrus decurrens	87	2
Abies concolor	84	2
Pseudotsuga menziesii	81	3
Pinus lambertiana	77	2
Pinus jeffreyi	23	3
Pinus ponderosa	19	2
Pinus monticola	6	2
Abies magnifica	6	2
TREES, SEEDLING		
Calocedrus decurrens	61	2
Pseudotsuga menziesii	42	2
Abies concolor	39	2
Pinus lambertiana	26	2
Pinus jeffreyi	9	2

SHRUBS	P%	C/A
Quercus vaccinifolia	100	7
Rhamnus purshiana	61	2
Garrya fremontii	55	2
Arctostaphylos patula	52	2
Amelanchier pallida	48	2
Ceanothus prostratus	32	3
Quercus chrysolepis	23	2
Ceanothus cordulatus	19	2
Rosa gymnocarpa	13	2
Cornus nuttallii	13	2
Toxicodendron diversilobum	13	2
Chrysolepis sempervirens	10	2
Quercus kelloggii	10	1
Rhododendron occidentale	10	2
Ceanothus integerrimus	10	3
Symphoricarpos hesperius	6	2
Ceanothus pumilus X prostratus	6	2
Ceanothus velutinus	3	1
Holodiscus discolor	3	2
Spiraea douglasiana	3	1
Vaccinium arbuscula	3	2
Ribes roezlii	3	2
Eriodictyon californicum	3	2
Ceanothus velutinus X prostratus	3	2
Ceanothus pumilus	3	2
HERBS		
Polygala cornuta	68	2
Pteridium aquilinum	48	2
Chimaphila umbellata	42	3
Iris tenuissima	42	2
Cheilanthes gracillima	35	2
Xerophyllum tenax	29	2
Galium bolanderi	26	2
Aspidotus densa	23	2
Thermopsis gracilis	19	2
Bromus marginatus	19	2
Apocynum pumilum	16	2
Trientalis latifolia	16	2

Table 2. Heights (in feet) and ages determined from cores of *Pseudotsuga menziesii*. Trees cored at breast height.

Tree	Age	Height
1	194	85
2	234	95
3	175	95
4	52	51
5	114	110
6	117	110
7	107	40
8	45	19
9	102	82
10	477	142

Appendix I. Taxa recognized within the proposed Preacher Meadows Research Natural Area. Collected plants were identified using the facilities of the Humboldt State University Herbarium (HSC). Vouchers are deposited there. Nomenclature follows P. Munz. 1959. A California Flora. Univ. Calif. Press, Berkeley. 1581 p. unless authorship is given.

Aceraceae

Acer macrophyllum

Anacardiaceae

Toxicodendron diversilobum Greene

Apocynaceae

Apocynum pumilum

Betulaceae

Alnus tenuifolia
Corylus cornuta var. californica

Caprifoliaceae

Lonicera conjugialis
Sambucus melanocarpa
Symphoricarpus hesperius

Caryophyllaceae

Arenaria congesta
Silene grayi

Compositae

Adenocaulon bicolor
Anaphalis margaritacea
Aster alpigenus ssp. andersonii
Chrysothamnus nauseosus
Cirsium douglasii var. canescens
Crepis pleurocarpa
Eriogonum flexuosus
Eriophyllum lanatum var. lanceolatum
Happlopappus whitneyi ssp. discoideus
Helenium bigelovii
Hieracium albiflorum
Microseris sp.
Rudbeckia californica var. intermedia
Senecio triangularis
Solidago californica

Convolvulaceae

Convolvulus malacopyllus

Cornaceae

Cornus nuttallii

Crassulaceae

Sedum obtusatum

Cupressaceae

Calocedrus decurrens (Torr.) Florin

Cyperaceae

Carex mendocinensis
Carex multicaulis
Carex ormantha
Carex sp.
Heleocharis sp.

Ericaceae

Arctostaphylos nevadensis
Arctostaphylos patula
Rhododendron occidentale
Vaccinium arbuscula

Fagaceae

Chrysolepis chrysophylla (Dougl. ex Hook.) Hjelmquist
Chrysolepis sempervirens (Kell.) Hjelmquist
Lithocarpus densiflora
Quercus chrysolepis
Quercus chrysolepis var. *nana*
Quercus kelloggii
Quercus vaccinifolia
Quercus chrysolepis nana x *vaccinifolia*

Garryaceae

Garrya fremontii

Gentianaceae

Frasera albicaulis ssp. *nitida*

Gramineae

Agropyron trachycaulum
Bromus marginatus
Danthonia californica
Danthonia unispicata
Deschampsia caespitosa
Elymus glaucus
Festuca californica
Festuca occidentalis
Muhlenbergia mexicana
Poa sp.
Sitanion jubatum
Stipa lettermanii

Grossulariaceae

Ribes roezlii
Ribes sanguineum

Hydrophyllaceae

Draperia systyla
Eriodictyon californicum
Phacelia leonis
Phacelia mutabilis

Iridaceae

Iris tenuissima
Sisyrinchium bellum

Juncaceae

Juncus ensifolius
Juncus mertensianus

Labiatae

Monardella odoratissima
Scutellaria antirrhinoides
Stachys rigida

Leguminosae

Lotus oblongifolius
Lotus purshianus
Lupinus andersonii
Lupinus croceus
Thermopsis gracilis
Trifolium breweri
Trifolium longipes

Liliaceae

Calochortus nudus
Clintonia umniflora
Dichelostema multiflorum (Benth.) Heller
Disporum hookeri var. *trachyandrum*
Erythronium hendersonii
Lilium kellyanum
Lilium rubescens
Narthecium californicum
Schoenolirion album
Smilacina racemosa
Triteleia hyacinthina (Lindl.) Baker
Zigadenus venenosus

Loranthaceae

Phorodendron juniperinum ssp. *libocedri*

Malvaceae

Sidalcea oregona ssp. *spicata*

Onagraceae

Epilobium minutum

Orchidaceae

Corallorhiza maculata
Cypriped californicum
Goodyera oblongifolia
Platanthera hyperborea (L.) Lindl.

Pinaceae

Abies concolor
Abies magnifica var. shastensis
Picea breweriana
Pinus jeffreyi
Pinus lambertiana
Pinus monticola
Pinus ponderosa
Pseudotsuga menziesii

Polemoniaceae

Collomia tinctoria

Polygalaceae

Polygala cornuta

Polygonaceae

Eriogonum nudum
Eriogonum umbellatum
Rumex acetosella

Polypodiaceae

Adiantum pedatum var. aleuticum
Aspidotis densa
Athyrium alpestre var. americanum
Cheilanthes gracillima
Cryptogramma acrostichoides
Polystichum imbricans (D.C. Eat.) Wagner
Pteridium aquilinum var. pubescens

Portulaceae

Lewisia nevadensis

Primulaceae

Trientalis latifolia

Pyrolaceae

Chimaphila umbellata var. *occidentalis*
Pyrola picta
Pyrola picta forma *aphylla*
Pyrola picta ssp. *dentata*

Ranunculaceae

Anemone drummondii
Aquilegia formosa

Rhamnaceae

Ceanothus cordulatus
Ceanothus cuneatus
Ceanothus integerrimus
Ceanothus prostratus
Ceanothus pumilus
Ceanothus velutinus
Ceanothus prostratus x *pumilus*
Ceanothus velutinus x *prostratus*
Rhamnus purshiana

Rosaceae

Amelanchier pallida
Cercocarpus betuloides
Holodiscus discolor
Horkelia tridentata
Physocarpus capitatus
Potentilla glandulosa
Potentilla glandulosa ssp. *nevadensis*
Rosa gymnocarpa
Rosa pisocarpa
Rubus leucodermis
Rubus parviflorus
Spiraea densiflora
Spiraea douglasiana

Rubiaceae

Galium bolanderi

Salicaceae

Salix commutata
Salix exigua

Sarraceniaceae

Darlingtonia californica

Scrophulariaceae

Castilleja applegatei
Cordylanthus viscidus
Mimulus guttatus
Mimulus primuloides
Penstemon brachyanthus
Penstemon procerus

Taxaceae

Taxus brevifolia

Umbelliferae

Angelica arguta
Ligusticum californicum

Violaceae

Viola macloskeyi
Viola sheltonii